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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,041	02/06/2004	Fufang Zha	2002P87049WOUS	4995

7590 06/12/2007

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EXAMINER	
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ART UNIT	PAPER NUMBER
1723	

MAIL DATE	DELIVERY MODE
06/12/2007	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/774,041
Filing Date: February 06, 2004
Appellant(s): ZHA ET AL.

Peter C. Lando
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 3/30/07 appealing from the Office action mailed 8/2/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct. Please note that support for the subject matter of the sole independent claim 1 can be found in the paragraphs [0031] to [0036] of the corresponding US Pre-Grant Publication.

(6) Grounds of Rejection to be Reviewed on Appeal

Grounds for rejection is substantially correct.

Claims are separately rejected:

I. 35 USC 102(b)/103(a) over the Sunaoka reference, and

II. 35 USC 103 (a) over the Beck reference.

GROUNDS OF REJECTION NOT ON REVIEW

The following grounds of rejection have not been withdrawn by the examiner, but they are not under review on appeal because they have not been presented for review in the appellant's brief. Obviousness type double patenting of claims 1-13 over copending application no. 10/572,893 in view of Sunaoka.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,159,373	BECK et al	12-2000
5,209,852	SUNAOKA et al.	05-1993

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-13 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 and 19-23 of copending Application No. 10/572,893 in view of Sunaoka et al (US 5,209,852). Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter claimed in both applications is the same, except for the step of the fast drain using compressed air, which step is taught by Sunaoka. It would be obvious to one of ordinary skill in the art at the time of invention to use the fast drain as taught by Sunaoka in the claims of '893 application to blow down the accumulated dirt in the tank (see Sunaoka column 9 lines 1-21).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-13 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by, or in the alternative, under 35 USC 103(a) as being obvious over, Sunaoka et al (US 5,209,852).

Sunaoka teaches a process of treating wastewater containing solids using a hollow fiber membrane system (figures and abstract) and cleaning the system as claimed. Cleaning steps comprises suspending filtration, dislodging contaminants using air bubble scrub (abstract), backwashing (column 1 lines 45-50: flowing water during or after scrub is known in the art; column 10 lines 58-64: using gas), and quick draining of the tank by gravity or using compressed air (column 8 line 63 – column 9 line 6). Use of compressed air would inherently generate a gas-containing region in the tank (a head space) of the reference, as claimed. Sealing the tank (feed containing vessel) before pressurizing would be implied by the reference, [emphasis added in the examiner answer] without which the vessel would not hold the pressure; opening the tank to atmosphere, which is to the drain, also is implied, for the draining to happen. The reference teaches fast draining (column 9 lines 1-7); draining speed can be optimized as seen in column 10 lines 28-35. Air is introduced through a side for scrubbing (see figure 2: air nozzle 15B). The sweep is in different directions – air sweep by scrubbing air from bottom to top; sweep by draining water from top to bottom. The reference teaches that compressed gas can be introduced through any of the nozzles in the figure 2 (column 8 line 63 – column 9 line 6) for draining the tank. The gas-containing region in a 'further vessel' (as in claim 11) would be implied or inherent in Sunaoka because compressed air is delivered form a compressor/air tank, which are vessels. "[I]n

considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968); In re Lamberti, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976). The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness." In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also In re Grasselli, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983).

Regarding claims 13 and 25, the pressure between the two sides of the membrane would equalize when the tank is sealed for pressurizing, when done simultaneously with compressed air backwash as cited in column 10 lines 58-65, because the membrane is highly permeable, and there would be no flow through the tank or the membrane. This would be an inherent characteristic of the system. Depressurization of the tank to drain the tank would drop the pressure in the tank, and would result in an instantaneous backwash flow from the inside of the membrane to the tank during draining.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 9-13 and 25 are rejected under 35 U.S.C. 103(a) as unpatentable over Beck, et al (US 6,159,373).

Beck teaches the process of filtering and cleaning a hollow fiber membrane submerged in water. The process comprises stopping filtration, pressurizing the lumen of the hollow fibers with a gas after closing the outlet valve, and then opening the outlet valve to decompress the gas, which expands to back-flush the membrane and sweep the outer surface of the membrane as claimed. See column 1 line 35 – column 2 line 67, column 5 lines 45). Additional vessel of compressed gas is taught in lines 35-40, column 5, to prolong the compressed gas flow through the lumen of the fibers. Liquid back flush is taught in lines 13-20: permeate in the lumen is back drained by gas in the lumen.

With respect to the pressurizing of a gas containing region, and then opening the vessel to the atmosphere to produce a sweep of the vessel, see column 5 lines 13-45. Even though the process steps described are not identical, they would be obvious to one of ordinary skill in the art because the reference teaches pressurizing the lumen side with the feed side of the membrane with the vessel or housing sealed. This would equalize pressure on both sides of the membrane since the membrane is highly

permeable. After such pressurizing, the feed side of the membrane module is opened to 'explosively depressurize' the system, which would obviously sweep or flush liquid from the feed side of the module. The reference teaches that the gas would not penetrate the membrane during pressurization because the feed side is full of liquid, and the liquid is incompressible. However the pressure would equalize by principle of hydraulics, since there is no flow. The reference may not be describing "a gas containing region on the first side" as claimed, which, could be arguable as "required to sustain the sweep for a period of time"; however, the reference teaches that the explosive decompression can be sustained for a while by providing larger diameter inlet ports 16 and 18, etc., which would make the process step an obvious equivalent.

(10) Response to Argument

A. Claims 1-13 and 25 are unpatentable over Sunaoka:

The claims were rejected 102(b)/103(a), implied/inherent, over Sunaoka.

Claim 1 recites:

A method for cleaning a membrane filtration module, the module comprising at least one membrane located in a feed-containing vessel, the membrane comprising a permeable wall, the method comprising:
conducting a filtration operation wherein a feed is applied to a first side of the permeable wall and a filtrate is withdrawn from a second side of the permeable wall;
suspending the filtration operation;
performing a cleaning process on the permeable wall to dislodge a contaminant therefrom into a liquid surrounding the membrane;
forming a gas-containing region on the first side of the permeable wall;
sealing the feed-containing vessel; pressurizing a gas within the gas-containing region; and

opening the feed-containing vessel to atmosphere, whereby the gas-containing region expands and produces a sweep of the feed-containing vessel to remove the liquid containing the dislodged contaminant. [Italics added]

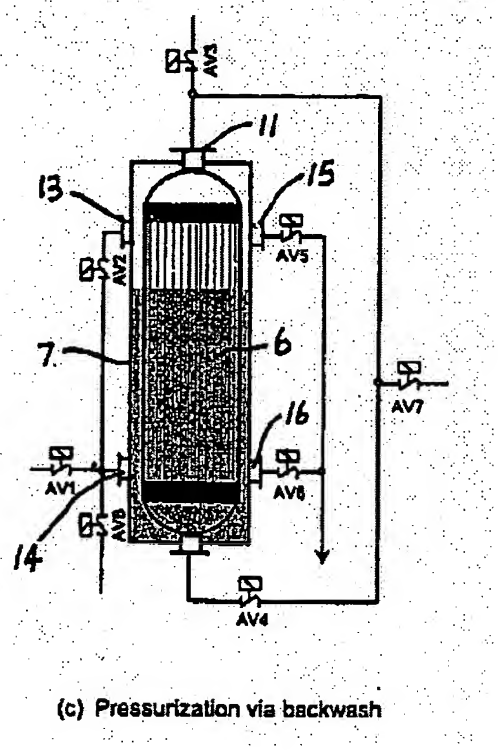
There is no contention on the normal operation part of the claim. The contended part of the claim, shown in italics above, as argued by the appellant is:

- Steps of gas containing region on the first side of the permeable wall (first side is identified as the feed side)
- Sealing the feed-containing vessel
- Pressurizing a gas within the gas containing region
- Opening the feed containing vessel to the atmosphere

Whereby the gas-containing region expands and produces sweep of the feed-containing vessel to remove the liquid containing the dislodged contaminant (which implies a quick drain).

Appellant's Disclosed Method:

Appellant's disclosed system, as presented in paragraphs [0031] to [0036] of the Pre-Grant Publication, and figures 2(a) – 2(d) (figure 2(c) is shown below):



(c) Pressurization via backwash

AV6: drain valve

AV4 and AV7: back-flush valve

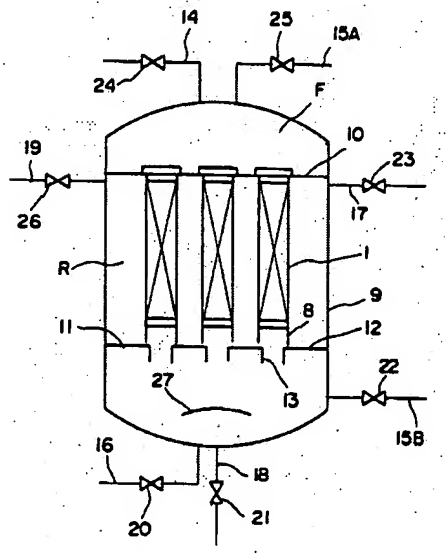
Appellant produces a gas-containing region on the feed side by partially filling air from the gas scrubbing process (paragraph [0034]). Appellant then pressurizes the feed side of the vessel by applying backpressure through the filtrate side of the membranes using the filtrate or permeate water (paragraph [0035]). This is a slow process as admitted by the appellant, and, obviously, pressurization cannot be sustained with the drain valve (AV6) open. Appellant's disclosed process therefore requires the drain valve closed to attain sufficient air pressure in a large-enough air space for making the sweep flow possible. ***However, appellant's claims are broader and do not recite the disclosed details to assert the criticality of having the drain valve closed before commencing pressurization.***

Process Taught by Sunaoka:

Appellant argues that the Sunaoka reference fails to disclose or suggest the alternative method for effecting a high velocity drain down to remove accumulated solids, and more specifically, Sunaoka does not teach or suggest a method involving sealing the feed containing vessel and pressurizing a gas within a gas-containing region as presently recited.

This argument is not accurate; Sunaoka teaches a high velocity drain down after sealing the feed containing vessel and pressurizing a gas containing region with a gas as recited in Claim 1. Sunaoka's figure 2 is reproduced below.

FIG. 2



Valve 20: feed water inlet

Valve 21: drain

Valve 22: compressed air inlet

Valve 23 and line 17: air discharge; alternately, compressed air inlet

Valve 24: filtered water outlet

Valve 25: air inlet on the filtrate side

Valve 26: fresh water inlet; alternately compressed air inlet.

Sunaoka teaches the steps of providing the gas containing region, pressurizing and then quick draining in column 8, line 63 – column 9, line 6. Sunaoka teaches that

wastewater can be quickly drained by the use of the water head; and at column 9, lines 1-6, he teaches:

> Alternatively, compressed air may be charged into the filter column 9 via the air discharge piping 17, the compressed air charge piping 15B or the water replenishment piping 19 to utilize the pressure of the compressed air to effect quick draining of the wastewater. [underline added]

This paragraph teaches or suggests that the feed side of the vessel is pressurized with air, which implies that the system is 'sealed', without which it cannot be pressurized. The reference does not say if the drain valve 21 is open or closed while compressed air is admitted in to the vessel to pressurize. However, a fair reading of the teaching in column 8, lines 63-68 shows that to use the water head to drain, Sunaoka teaches leaving valve 23 (scrub air vent – line 17) open (obviously to admit atmospheric air to break vacuum and help drain the tank), closing valve 22, and opening drain valve 21. ***Please note the sequence***. Particularly, valve 23 is open before opening the drain valve; otherwise the water would not drain fast enough due to the vacuum generated in the tank. If one follows the same logic from these lines, for the alternate steps of pressurizing with compressed air, one of ordinary skill would first apply the compressed air through one or more of the suggested lines, ***which includes line 17 (valve 23),*** and then open the drain valve. The examiner believes that such steps are implied, or immediately envisaged, in the reference. If not, one would utilize these steps particularly to obtain the full force of compressed air to drain the liquid fast.

However, irrespective of when the drain valve is open, whether while introducing compressed air in to the vessel or thereafter, the reference clearly teaches "quick drain"

as is required in the claim language of "produces a sweep of the feed-containing vessel to remove the liquid containing the dislodged contaminant". With the Sunaoka system, even if the drain valve is opened before commencing pressurization, the liquid in the tank would provide the seal required for pressurizing. Giving the broadest reasonable interpretation, the claim language requires only a seal to build up compressed air pressure; claim does not recite what kind of seal, nor closing the drain valve.

While having the drain valve closed is critical for the appellant's disclosed process because of the reasons described above, Sunaoka system is not limited by the slow pressurization and therefore, may not require the drain valve closed for pressurizing. Sunaoka pressurizes the feed side of the vessel directly through a compressed-air line, and such pressurization is sustainable even with the drain valve open. Therefore, having the drain valve closed before commencing pressurization is not critical to Sunaoka.

Alternately, the Examiner believes that because the drain valve is normally closed, the teaching of the reference implies that the drain valve is opened after commencing pressurization with compressed air. However, even if it be adjudged that there is no such implied teaching in the reference, it would be obvious to one of ordinary skill in the art at the time of invention to open the drain valve after the commencement of pressurization to fully utilize the air pressure to drain the liquid fast. A stricter than the broadest reasonable interpretation of the claim language would only require that the

pressurization is commenced before opening the vessel to the atmosphere (i.e., the drain valve), because the claim does not specify a pressure to be attained before opening the vessel to the atmosphere. Appellant has not shown any evidence that the teaching of the reference would not perform the result desired in the claim, nor shown any criticality of having the drain valve closed before commencing the pressurization. It would be within the skill level of one of ordinary skill in the art to close the drain valve if the pressure does not build up fast enough in the tank with the drain valve open, and open the drain valve only after attaining the desired pressure so that the tank can be drained quickly.

Further, if one were to interpret the reference as teaching the steps (1) open the drain valve, (2) admit compressed air into the vessel, in that sequence, then the steps recited in the claim would differ only in the order presented. Selecting or changing order of process step is prima facie obvious. Ex parte Rubin , 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.). See also In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) (selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results); In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930) (Selection of any order of mixing ingredients is prima facie obvious.). Appellant has not sown any criticality of having the drain valve closed before pressurizing.

In response to Appellant's argument:

> "Sunaoka makes no inference or teaching that valve 21 is initially closed when compressed air is used to enhance drain down. Nor is there any inherent requirement for valve 21 to be closed if compressed air is used."

Please note that the appellant misquotes the rejection in this argument. The inherency part of the rejection of claim 1 is to show that the "gas-containing region" is inherent (because the reference teaches scrubbing with air before draining; the air will accumulate in the tank above the liquid, above the line 17 and below the partition 10 – see the figure). The steps "sealing the feed containing vessel" and "opening the feed containing vessel to atmosphere" were rejected as implied by the reference. Steps of closing and opening valves require human intervention; they are not *inherent*.

Now, *there is no teaching or suggestion in Sunaoka for one to conclude that the valve should be open before commencing pressurization with compressed air either.* Therefore, when to open the drain valve in the Sunaoka process is up to one of ordinary skill in the art to decide. Drain valve 21 in Sunaoka is normally closed (Sunaoka reference teaches opening valve 21 for draining only after the scrubbing step: see column 8, at line 63). Three possibilities exist in this situation: (1) Drain valve opened before admitting compressed air in, (2) drain valve opened after starting admitting compressed air, and (3) open the drain valve and admit compressed air simultaneously. **(The drain valve has to be open some time during the process, because it is a normally closed valve)** In any of the three possibilities, the vessel is pressurized, and the reference implies that the vessel continues to be pressurized even while draining.

Appellant's argument traversing inherency is quoted below:

"Sunaoka clearly states that valve 21 is opened to enable drainage, and that the draining step may make use of a water head or compressed air to effect quick draining of waste water. Sunaoka makes no inference or teaching that valve 21 is initially closed when compressed air is used to enhance drain down. Nor is there any inherent requirement for valve 21 to be closed if compressed air is used. To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. (See In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999); MPEP at Section 2112)." [emphasis added by the Examiner]

The Examiner agrees that extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. The missing descriptive matter in the reference according to the appellant is the portion underlined in the paragraph quoted above. Logical following and common sense dictates that the teaching of the reference would suggest that valve 21 would be initially closed when compressed air is used, as shown above. However, appellant's argument targeting the drain valve is beyond the scope of the claim. The claim recites a broad limitation of "sealing the feed containing vessel". The seal, as explained supra, is provided by the liquid in the tank between the compressed air region and the drain valve, which would allow the air space in the tank to be pressurized even if the drain valve is left open. (Please note that compressed air would expand and fill the space at a significantly faster pace than the rate at which the liquid drains out). This would

provide ample extrinsic evidence that the missing descriptive matter, i.e., "sealing the feed containing vessel", is present in the teaching of the reference.

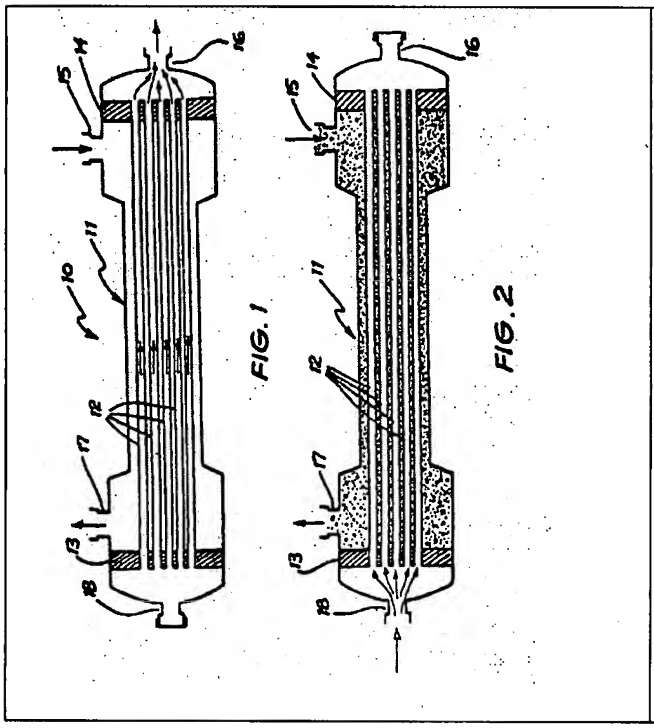
B. Claims 1-4, 9-13 and 25 are unpatentable over Beck:

Beck teaches pressurizing the vessel through the filtrate side (the lumen side) of the hollow fibers as is disclosed by the appellant. The difference is that Beck uses compressed air, whereas appellant discloses pressurizing with liquid permeate.

Beck teaches that because the feed side is full of liquid (incompressible), compressed air will not collect in the feed side as the system is pressurized. This teaching of Beck is debatable because it is against the principle of hydraulics and the Bernoulli Principle. The hollow fiber membranes are microporous and highly permeable. In the sealed the vessel, when the lumen side of the membrane is pressurized by compressed air to a pressure above the bubble point* of the hollow fibers, air will move through the pores of the membrane from the filtrate side to the feed side to equalize pressure on both sides of the membrane (hydraulics principle), and by principle of gravity, it will collect on the top of the liquid, creating an air-filled region. The amount of air thus collected may be very small because the liquid is incompressible. (Please note that appellant's claim 1 does not recite any specific volume for the air-filled region). This process is inherent in fluid systems, and will continue until the pressure on the inside and outside sides of the hollow fibers equalize – Bernoulli principle and principle of hydraulics. Having said that, even if it be adjudged that no air will flow across the

membrane until the shell is open *because the reference teaches so*, air would start filling above the liquid on the feed side of the membrane under pressure, as soon as the shell is open. Thus claim 1 would be obvious from the disclosure of Beck.

Beck's figures 1 and 2 are shown below:



16 and 18: lumen side ports

Appellant's contention is that Beck does not teach or suggest pressurizing a gas in a gas-containing region on the feed side of the permeable wall, and therefore, claim 1 is patentable over Beck.

The Examiner disagrees. A gas-containing region will form on the feed side of Beck, as shown above, because the feed side is not under pressure, and the pressure

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* Water Bubble Point: pressure at which air or gas would break-through a water-wet membrane. Bubble point in a microporous membrane is relatively low compared to the compressed air pressure.

and gas gets transmitted through the pores of the membrane and the pressure will equalize on both sides by principle of hydraulics. Even if the gas-containing region is not formed immediately on commencement of pressurization, it will form as soon as the shell is opened. Beck teaches sustaining pressure in the lumen (filtrate side), and thereby in the shell (feed side), by providing large diameter pressure feed and/or from both ports 16 and 18 (column 5, lines 36-42).

Thus the intended purpose of "sweep of the feed containing vessel" as required in claim 1 is met by the reference.

If, on the other hand, Beck's teaching that *no gas would flow through the membrane until the shell is open* is followed, then appellant's claim 1 differs from the teaching of Beck only in the order of process steps. Particularly, 'forming the gas-containing region' would be after 'opening the feed containing vessel'. However, appellant has not established any criticality for the sequence of process steps, and the claimed sequence of process steps is not critical to Beck. Beck teaches in column 5, lines 43-45, that shell can be opened just before or at the same time as the pressurized gas is applied as an alternate process. Appellant's criticality of the sequence of the process steps stems from the fact that appellant's disclosed process of pressurization by applying back-pressure with liquid filtrate (permeate) is very slow; but the claims do not recite this critical process step necessary for the criticality of the order of process steps.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/K.S.Menon/

Krishnan S. Menon, Primary Examiner

Conferees:

/Jennifer Michener/

Quality Assurance Specialist, TC 1700

/David R. Sample/

David Sample, SPE